AMENDMENTS TO THE DRAWINGS

Replacement formal Figure 1 is submitted concurrently herewith under a separate cover letter.

REMARKS

In view of the above amendments and the following remarks, reconsideration of the objections and rejections contained in the Office Action of December 5, 2008 is respectfully requested.

In order to make necessary editorial corrections, the entire specification and abstract have been reviewed and revised. As the revisions are quite extensive, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. For the Examiner's benefit, a marked-up copy of the specification and abstract indicating the changes made thereto is also enclosed. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested.

The Examiner objected to the drawings because Figure 1 required a "Prior Art" designation. In view of this objection, new formal Figure 1 has been prepared and submitted herewith in order to add the required designation. As a result, it is respectfully submitted that the Examiner's objection to the drawings has been overcome.

The Examiner rejected claims 8-12 and 21-22 as being anticipated by the Fukunaga reference (USP 6,743,395; EP 1,199,123; or WO 01/70435); rejected claims 8-12 and 21-23 as being anticipated by the Rajagopalan reference (USP 6,860,924); and rejected claims 8 and 10-12 as being anticipated by the Adams reference (USP 6,649,138). However, all of the rejected claims have been cancelled and replaced with new claims 29-41, and all of the new claims read on the elected invention of Group 1. For the reasons discussed below, it is respectfully submitted that the new claims are clearly patentable over the prior art of record.

As generally explained on pages 1 and 2 of the original specification, it is desirable to eliminate solders containing lead for environmental reasons. One possible replacement for lead-containing solders is the use of metal nanoparticles. However, in order to be useful in semiconductor devices and electrical components, the metal nanoparticles must have a relatively low bonding temperature of around 200° C. Unfortunately, conventional metal nanoparticles have strong chemical bonds between an outer protective organic substance and a metal core.

Therefore, a temperature of at least approximately 250° C is necessary to separate the organic substance from the metal core to uniformly sinter the metal core. Therefore, conventional metal nanoparticles are unacceptable for use in semiconductor devices and electrical components as a replacement for lead-containing solder. The present invention has been developed in order to address this problem.

As recited in new independent claim 29, the present invention is directed to a composite nanoparticle that comprises a core comprising *an inorganic metal compound **and** a metal component*. In addition, the composite nanoparticle comprises a coating of an organic substance bonded to the core *by physical adsorption* (see, for example, page 18, line 24- page 19, line 7; and page 20, lines 18-28 of the original specification). The inorganic metal compound thermally decomposes at a relatively low temperature, and the physical adsorption bond is significantly weaker than the strong chemical bonds of conventional metal nanoparticles which are formed between an organic substance and a metal core. Consequently, the organic substance can be separated from the inorganic metal compound of the core at a much lower temperature and with a lower amount of energy, thereby making the composite nanoparticle of the present invention very appropriate for use in semiconductor devices and electric components (see page 6, lines 14-23; page 19, lines 8-17; and page 21, lines 1-10 of the original specification).

The Fukunaga reference discloses a composite metallic particle which includes a metal core surrounded by an organic compound (see column 4, lines 60-65). Thus, this arrangement simply corresponds to the general prior art discussed above, presumably with the same drawbacks. The Fukunaga reference does not, however, teach or suggest a core which comprises an *inorganic metal compound **and** a metal component*, as now recited in new independent claim 29. Moreover, the organic compound is bonded to the metal core by chemisorption (see, for example, column 2, lines 51-55 of the '395 Patent). Thus, the Fukunaga reference also does not teach or suggest an organic substance bonded to a core by physical adsorption. Consequently, it is submitted that the Fukunaga reference does not anticipate or even render obvious new independent claim 29.

The Rajagopalan reference teaches metal oxide nanoparticles of a metal oxide or a metal hydroxide (see column 15, lines 40-41), which are at least partially coated with materials such as surfactants, oils, polymers, resins, waxes, silyls, and mixtures thereof (see column 2, lines 24-34). However, the Rajagopalan reference does not teach or suggest a core comprising a metal component. More particularly, the Rajagopalan reference does not teach or suggest a core comprising an inorganic metal compound *and* a metal component. Therefore, the Rajagopalan reference also does not anticipate or even render obvious new independent claim 29.

The Adams reference teaches metallic nanoparticles including an inner core composed of a semiconductive material ***or*** a metallic material (see column 3, lines 39-41 and claim 1). Therefore, although the Adams reference also teaches that the semiconductive material can be inorganic (see claim 3), the Adams reference does not teach or suggest a core comprising an inorganic metal compound ***and*** a metal component. Therefore, it is submitted that the Adams reference also does not anticipate or even render obvious new independent claim 29.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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